



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

Date: April 12, 1988

In reply refer to: A-88-42 through -44

Honorable T. Allan McArtor  
 Administrator  
 Federal Aviation Administration  
 Washington, D.C. 20591

Since 1980, Piper Model PA-60 Aerostar 600-series airplanes have been involved in four accidents and eight incidents (see table on page 5) in which the main cabin entry door opened (and in some cases, separated) inadvertently in flight. The latest of these, an incident, occurred on January 14, 1987, when the cabin door on a PA-60 Aerostar 600 airplane, N6070D, popped open and separated while the airplane was in cruise flight near Jacksonville, Florida. Additionally, six service difficulty reports (SDR) have been filed with the Federal Aviation Administration (FAA) relating to similar in-flight openings or separations of the cabin doors.

All four accidents occurred during takeoff. As a result of the accidents, one person (a pilot) was killed, three persons were injured seriously, and all four airplanes were damaged substantially or destroyed. Descriptions by pilots, passengers, and witnesses of the circumstances that led to the accidents illustrate the hazards of a cabin door that is open or ajar during takeoff in this high-performance, twin-engine airplane. Excerpts from such descriptions include:

- o . . . and the door became fully opened causing the plane to fishtail, roll from side to side, and shake violently. . . .
- o . . . observed the aircraft in a steep left bank descending until it crashed . . . cabin door popped open during the initial climb after takeoff distracting the attention of the pilot who lost control of the aircraft. . . .
- o . . . my efforts were divided between flying the airplane and the emergency situation . . . got behind the power curve . . .

The circumstances of one accident were further complicated by instrument meteorological conditions encountered shortly after takeoff.

Comments contained in incident reports and SDRs relating to in-flight openings of Piper Aerostar cabin doors include the following:

- o Door came off during climb to cruise; apparently door was not properly latched; no indication of problem with door.

- o Pilot unable to pressurize; found access door slightly open; depressurized; door opened fully; stopped by fuselage.
- o Upper half of cabin door opened in flight and blew off; cause unknown.
- o During climb, the door suddenly opened and top half separated aircraft; door found but cause unknown.
- o Upper portion of cabin door departed aircraft on takeoff; door had torn loose from its top mounting.
- o Upper half of cabin door blew off on climbout; no malfunction found; possibly not closed properly.
- o Top cabin door popped open breaking restraining strut; found door closed indication when door not secure.
- o After experiencing turbulence, upper cabin door opened in flight; pilot made normal landing; suspect that door handle was partially released during turbulent flight.
- o Upper half cabin door departed aircraft; probable cause: door not latched or completely locked.
- o Upper door came open in flight; door did not separate from aircraft. Pilot returned to airport without incident; inspection found nothing wrong with door or linkage.
- o Found no contributing mechanical fault with the door mechanism; assume latched incorrectly.
- o Upper cabin door separated from aircraft in climb; door not recovered.
- o Top cabin door front locking pin not going into door frame socket; it was misaligned about 1/3 to 1/2 diameter of pin; control rod in door bent to allow door handle to go to closed position. It apparently had been this way since it left factory in 1980; suggest all doors be checked.

The Piper Aerostar cabin door, a two-piece clamshell-type unit hinged at the top and bottom, is located on the left side of the fuselage at the pilot's station. For proper operation, the upper door is opened first and the lower door is closed first. The upper door locking mechanism consists of one internal and one external handle which actuates power pins (locking bolts) at the center of the side frames. The positions of the locking bolts are indicated by two guide pins that are set at right angles to the locking bolts and protrude through slots in the trim molding. Safe-unsafe placards on the left and right sides of the door show the position of the guide pins relative to full closure of the locking mechanism.

The Piper Aerostar maintenance manual indicates that the cabin door should be inspected for proper rigging at 100-hour service intervals. The exterior check of

the locking mechanism consists of measuring the pins for proper extension. If the pins do not extend the proper amount, the door interior trim molding must be removed and the appropriate linkage rods must be adjusted as necessary. The pins and striker plates also should be inspected for bending, cracks, proper engagement, pulled or sheared fasteners, and bending of the frame web.

The Safety Board believes that in-flight openings or separations of Piper Aerostar cabin doors reflect not only the importance of preflight checklists but also a need to pay stricter attention to proper inspection and rigging of the doors. Some of the occurrences may have been a direct result of misrigging; e.g., those occurrences indicating that the door came open in turbulence; that safe-unsafe placards provided a closed-door indication when, in fact, the door was not secured; and that the door front locking pin was misaligned and the associated linkage rod was bent. As a result, the Safety Board believes that the FAA should issue an airworthiness directive (AD) requiring that Aerostar cabin entry doors be inspected for proper rigging at each 100-hour and each annual inspection.

A Piper Aerostar cabin entry door that is open or ajar in flight is hazardous because it provides a significant distraction to the pilot and may adversely affect airplane performance, particularly during takeoff. As a result, in 1984, Piper initiated a program to design a cabin door warning light for the Aerostar series airplanes, and on February 7, 1985, Piper issued service bulletin No. 980, "Cabin Entrance Door Ajar Warning System," applicable to PA-60 Aerostar 600, 601, 601P, 602P, and 700P airplanes. Service bulletin No. 980 announced the availability of entrance door ajar warning system retrofit kits and recommended that they be installed at the next regularly scheduled inspection event or at owner/operator discretion. Installation of the kits will provide a visual warning in the form of an annunciator light on the instrument panel which will alert the pilot should the upper cabin door be improperly secured. Piper previously had initiated routine installation of the warning systems on PA-60 Aerostar 700P airplanes. The Safety Board concurs with the action taken by Piper and believes that the FAA should issue an AD requiring installation of the door ajar warning kits on all PA-60 Aerostar models.

Pilot confusion as to the proper direction of rotation of the main cabin door latching handle in early model Piper PA-60 Aerostar airplanes may be a factor in certain door ajar occurrences. For example, some Aerostar model 600 and 601 airplanes are equipped with small D-ring handles which rotate counterclockwise to lock while other model 600, 601, and 601P airplanes are equipped with large D-ring handles which rotate clockwise to lock. To help avoid such confusion, Piper, on July 3 1978, issued service bulletin No. 600-74, "Main Cabin Door Placards," applicable to these airplanes. The service bulletin stated:

Effective with airframe sequence number 0546, all Aerostars will have decals installed on the main cabin door D-ring handle to provide a positive indication of the direction of handle rotation. An index decal will also be installed on the escutcheon to provide an additional indication of the cabin door being closed and locked; it must be emphasized, however, that the cabin door pin indicators still provide the primary indication and must be checked to ensure that the door is locked. This service bulletin provides instructions for decal installation on earlier airplanes.

The Safety Board believes that the FAA should issue an AD requiring that main cabin door placards be installed in earlier PA-60 Aerostar airplanes at the next 100-hour or annual inspection, whichever occurs first.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Issue an airworthiness directive requiring that the main cabin entry doors of Piper PA-60 Aerostar 600, 601, 601P, 602P, and 700P airplanes be inspected for proper rigging at each 100-hour and each annual inspection. (Class II, Priority Action) (A-88-42)

Issue an airworthiness directive applicable to Piper PA-60 Aerostar 600, 601, 601P, 602P, and 700P airplanes, requiring at the next 100-hour or annual inspection, whichever occurs first, compliance with Piper service bulletin No. 980 concerning the installation of cabin entry door ajar warning systems. (Class II, Priority Action) (A-88-43)

Issue an airworthiness directive applicable to Piper PA-60 Aerostar 600, 601, and 601P airplanes, requiring at the next 100-hour or annual inspection, whichever occurs first, compliance with Piper service bulletin No. 600-74 concerning the installation of main cabin door placards. (Class II, Priority Action) (A-88-44)

BURNETT, Chairman, KOLSTAD, Vice Chairman, and LAUBER and NALL, Members, concurred in these recommendations.

  
By: Jim Burnett  
Chairman

**TABLE.--PIPER MODEL PA-60 AEROSTAR AIRPLANE  
ACCIDENTS AND INCIDENTS INVOLVING  
INADVERTENT OPENING OF THE MAIN  
CABIN ENTRY DOOR IN FLIGHT  
1980 THROUGH 1987**

ACCIDENTS<sup>1/</sup>

<u>Date</u>	<u>Location</u>	<u>Model</u>	<u>Registration</u>
05/07/81	San Angelo, TX	PA-60-601P	N3642J
05/18/82	Titusville, FL	PA-60-601P	N90702
04/05/83	Tampa, FL	PA-60-601P	N6079R
01/05/84	Salt Lake City, UT	PA-60-601P	N234AD

INCIDENTS<sup>2/</sup>

<u>Date</u>	<u>Location</u>	<u>Model</u>	<u>Registration</u>
07/01/81	Mint Hill, NC	PA-60-600	7498S
11/17/82	Gorman, CA	PA-60-601P	90391
02/10/83	Denver, CO	PA-60-602P	999KS
08/24/84	Wichita, KS	PA-60-601B	61AM
04/12/85	Oklahoma City, OK	PA-60-600	3643R
04/15/85	Altus, OK	PA-60-602P	602AC
03/31/86	Tampa, FL	PA-60-600	338NA
01/14/87	Jacksonville, FL	PA-60-600	6070D

<sup>1/</sup> NTSB accident files.

<sup>2/</sup> FAA incident files.